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JP

(54) MAGNESIUM REPLENISHING MATERIAL

(57)Abstract:

PURPOSE: To obtain a magnesium replenishing material having excellent magnesium absorbability and availability in vivo and capable of preventing and treating various diseases caused by the insufficient intake of magnesium.

CONSTITUTION: This magnesium replenishing material, contains (A) magnesium source such as magnesium carbonate or magnesium chloride as a food additive or magnesium-rich seaweed, seed or rice sugar as natural magnesium source and (B) at least one kind of substance selected from scarcely digestible oligosaccharide, scarcely digestible sugar alcohol and dietary fiber at a weight ratio (magnesium in the component A/the component B) of 10-400. The component B is assimilable by enteric bacteria. The scarcely digestible oligosaccharide is e.g. fructooligosaccharide, beet oligosaccharide and lactooligosaccharide, the scarcely digestible sugar alcohol is e.g. maltitol, sorbitol and lactulose and the dietary fiber is e.g. alginic acid, its salt and pectin.

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CLAIMS

[Claim(s)]

[Claim 1] Magnesium supply material characterized by containing the source of magnesium, a difficulty slaking-property oligosaccharide and difficulty slaking-property sugar-alcohol, and at least one sort of matter of the dietary fibers.

[Claim 2] Magnesium supply material according to claim 1 it is 10 to 400 times whose rate (weight ratio) of a compounding ratio of the difficulty slaking-property oligosaccharide to the magnesium in the source of magnesium, difficulty digestive sugar-alcohol, and at least one sort of matter of the dietary fibers of this.

[Claim 3] Magnesium supply material according to claim 1 a difficulty slaking-property oligosaccharide, difficulty slaking-property sugar-alcohol, and at least one sort of whose matter of the dietary fibers are those in which a utilization is carried out by the enterobacterium.

[Claim 4] Magnesium supply material according to claim 1 whose difficulty slaking-property oligosaccharide is a fructo oligosaccharide.

[Claim 5] Magnesium supply material according to claim 1 which combines the source of magnesium with a dietary fiber.

[Claim 6] Magnesium supply material according to claim 5 which mixes the source of magnesium, and a dietary fiber in an organic solvent.

[Claim 7] Magnesium supply material according to claim 5 whose dietary fibers are either an alginic acid or its salt and pectin.

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Field

[Field of the Invention] About magnesium supply material, in detail, this invention is excellent in an absorptivity and relates to the magnesium supply material which has the improvement effect of the various morbid symptoms resulting from magnesium lack.

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Effect

[Effect of the Invention] Lack of magnesium is the risk factor of morbus, such as a renal calculus, diabetes, hypertension, and ischemic heart disease, and that of uptake of magnesium is effective in the enhancement in the motor function at the time of training by the sport etc. also in healthy people. Although target intake per day of the magnesium in the Homo sapiens is set to 300mg, it is difficult to attain this target in actual eating habits, and the shortage of uptake of about 100mg is pointed out in the present condition. Moreover, absorption of magnesium may not be used effectively in a living body, even if it is easy to be influenced by other meal components and it makes intake only increase. If the magnesium supply material of this invention excellent in the absorptivity and living body availability of magnesium is taken in, many the preventions and treatment of the morbus resulting from the shortage of uptake of magnesium can be carried out.

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TECHNICAL PROBLEM

[Description of the Prior Art] Magnesium is a mineral which is participating in many enzyme reactions in the living body. Moreover, since magnesium exists to a bone mostly in the living body, the lack causes osteoporosis and an osteomalacia. Furthermore, magnesium is participating also in the living body interior division cloth of the calcium which is the same bivalent ion, and a mineralization of heterotopia, such as a kidney stone, happens by the lack. It is thought besides this that lack of magnesium is the cause of the morbus of diabetes and hypertension.

[0003] The medication of magnesium to these morbus has a report that there is a treatment-effect. Moreover, it is thought from epidemiological investigation that the relative shortage of uptake to the calcium of magnesium is the cause of ischemic heart disease. Furthermore, also in healthy people, it is reported that uptake of magnesium is also effective in the enhancement in the motor function at the time of training by the sport etc.

[0004] Thus, it has been shown clearly that the physiological role with magnesium important in the living body is borne from the research latest [much]. Now, although target intake per day of the magnesium in the Homo sapiens is set to 300mg in our country, also by meal investigation that it is difficult to attain this target in eating habits, and actual, about 200mg is presumed, the shortage of uptake of about 100mg is pointed out, and the intake poses the problem. Moreover, it may be absorbed effective in a living body and absorption of magnesium may not be used, even if it is easy to be influenced of other meal components, such as a dietary fiber, and calcium, phosphorus, and it makes intake only increase.

[0005] It is in the purpose of this invention offering the supply material of magnesium excellent in the absorptivity that the trouble on the nutrition based on the present condition of such eating habits should be solved. It is known for many years that a lactose has an absorption promotion operation of calcium, and absorption of the calcium of cow's milk is considered to be the cause of a good thing. Moreover, a lactose will be hard to be digested if it compares with a sucrose, and the lactose intolerance is the typical example.

[0006] Such an operation was not specific to a lactose, and this invention persons formed the hypothesis that it is the operation common to the sugar-alcohol [at large] of a difficulty slaking property a sugar and at large which are hard to be digested with the digestive enzyme secreted by the living body, and repeated the research zealously. Consequently, some the oligosaccharides and sugar-alcohol of a difficulty slaking property found rather that there was an absorption promotion operation of a strong mineral rather than the lactose. Furthermore, the mineral absorption promotion operation of such a difficulty slaking-property oligosaccharide etc. discovered that it was more more powerful to receive [rather than] magnesium to calcium. After a difficulty slaking-property oligosaccharide reaches an intestinum crassum, this operation receives fermentation by the enterobacterium and is presumed to be what is depended on the organic acid produced at that time.

[0007] Moreover, generally, since the dietary fiber has the operation which carries out adsorption combination of various kinds of minerals, it is considered to act in prevention to a living body's mineral absorption. However, like a difficulty slaking-property oligosaccharide, also in a dietary fiber, although it changes with the modalities, as for a grade, in response to fermentation, an organic acid arises by the enterobacterium. Then, when performing the combination with the metal aiming at supply pertinently also in the dietary fiber, the dietary fiber considered that this invention persons might act on absorption of a mineral in promotion, and they repeated the research zealously.

Consequently, it turns out that the dietary fiber has the absorption promotion operation of a mineral. Absorption of the magnesium at the time of making the material which combined magnesium with the alginic acid especially take in made magnesium take in independently, and it found out excelling remarkably compared with the case where only mixed and an alginic acid and magnesium are made to take in. this invention is completed based on the above knowledge.

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MEANS

[Means for Solving the Problem] That is, the magnesium supply material characterized by this invention containing the source of magnesium, a difficulty slaking-property oligosaccharide and difficulty slaking-property sugar-alcohol, and at least one sort of matter of the dietary fibers is offered.

[0009] Although especially the source of magnesium used for this invention is not limited, it can use a magnesium carbonate, a magnesium chloride, and magnesium sulfate as a food additive. Moreover, the food into which these besides being semen, such as seaweeds, such as the high green laver of a magnesium content, a kelp, and a hijikia fusiformis, and a cacao bean, sesame, a soybean, an almond, a peanut, or rice bran, bittern, etc. as a natural source of magnesium were processed is suitable.

[0010] Next, as a difficulty slaking-property oligosaccharide used for this invention, a fructo oligosaccharide, a sugar beet oligosaccharide, galacto-oligosaccharide, galactosaccharide, etc. are suitable. Moreover, as difficulty slaking-property sugar-alcohol, a maltitol, a sorbitol, lactulose, etc. are suitable. Moreover, as a dietary fiber, an alginic acid or its salts, pectin, etc. are suitable. The material which combined magnesium with the dietary fiber can be manufactured, when this invention persons detach the source of magnesium, and a dietary fiber by solid-liquid after mixture in an organic solvent and make it dry by the already developed technique (JP,5-123136.A) and the same technique.

[0011] A difficulty slaking-property oligosaccharide, above-mentioned difficulty slaking-property sugar-alcohol, and the above-mentioned dietary fiber may be used independently, may be combined suitably and may be used. Here, the rate of a compounding ratio of the magnesium in the source of magnesium, a difficulty slaking-property oligosaccharide and difficulty slaking-property sugar-alcohol, and at least one sort of matter of the dietary fibers has the desirable thing of magnesium which these matter usually considers as ten to 400 times 10 or more times at a weight ratio.

[0012] Although the magnesium supply material of this invention can be taken in with all gestalt, such as a granule, a capsule, a tablet, powder material, and the solution, it cannot be overemphasized by that it may be blended with food and you may be taken in.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] About magnesium supply material, in detail, this invention is excellent in an absorptivity and relates to the magnesium supply material which has the improvement effect of the various morbid symptoms resulting from magnesium lack.

[0002]

[Description of the Prior Art] Magnesium is a mineral which is participating in many enzyme reactions in the living body. Moreover, since magnesium exists to a bone mostly in the living body, the lack causes osteoporosis and an osteomalacia. Furthermore, magnesium is participating also in the living body interior division cloth of the calcium which is the same bivalent ion, and a mineralization of heterotopia, such as a kidney stone, happens by the lack. It is thought besides this that lack of magnesium is the cause of the morbus of diabetes and hypertension.

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[0007] Moreover, generally, since the dietary fiber has the operation which carries out adsorption

combination of various kinds of minerals, it is considered to act in prevention to a living body's mineral absorption. However, like a difficulty slaking-property oligosaccharide, also in a dietary fiber, although it changes with the modalities, as for a grade, in response to fermentation, an organic acid arises by the enterobacterium. Then, when performing the combination with the metal aiming at supply pertinently also in the dietary fiber, the dietary fiber considered that this invention persons might act on absorption of a mineral in promotion, and they repeated the research zealously. Consequently, it turns out that the dietary fiber has the absorption promotion operation of a mineral. Absorption of the magnesium at the time of making the material which combined magnesium with the alginic acid especially take in made magnesium take in independently, and it found out excelling remarkably compared with the case where only mixed and an alginic acid and magnesium are made to take in. this invention is completed based on the above knowledge.

[0008]

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[0012] Although the magnesium supply material of this invention can be taken in with all gestalt, such as a granule, a capsule, a tablet, powder material, and the solution, it cannot be overemphasized by that it may be blended with food and you may be taken in.

[0013]

[Example] Although an example is given and being explained concretely hereafter, these do not limit this invention.

After breeding the Sprague-Dawley system male rat (weights 100-110g) of example 14 week-old for one week by the standard solid sample (product made from MF:oriental yeast), it carried out much one groups [seven], and the examination was presented. Considered the feed which does not contain magnesium as shown in Table 1 as the contrast, the rat was made to take in the feed which added the magnesium supply material which is six kinds from which the proportion of the fructo oligosaccharide which are the feed and magnesium which added only magnesium to this, and a difficulty slaking-property oligosaccharide is different for 14 days, and the accounts examination of magnesium was performed for the four days on the 14th from the 10th. Moreover, it observed also about the rubor symptom of the pinna section which is the deficiency symptom of magnesium, and the regio occipitalis capitis. Feed and potable water were considered as free uptake at potable water using the aqua destillata.

[0014]

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[0014]

[Table 1]

表1 試験試料組成表 (%)

	本発明のマグネシウム補給材							
	A	B	C	D	E	F	G	H
カゼイン	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
グラニュー糖	50.8	50.7	50.6	50.5	50.2	49.7	45.7	40.7
植物油	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
ビタミン混合(AIN-76 改変)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
セルロースパウダー	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
ミネラル混合	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
(AIN-76 改変マグネシウム無添加)								
炭酸カルシウム	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
無水二ナトリウム二水和物	6.0	6.0	6.0	6.0	3.0	6.0	6.0	6.0
炭酸マグネシウム	—	0.09	0.09	0.09	0.09	0.09	0.09	0.09
フラクトオリゴ糖	—	—	0.1	0.25	0.5	1.0	5.0	10.0
フラクトオリゴ糖/マグネシウム比			4.0	10	20	40	200	400

[0015] Weighing capacity of a part of produced feed and collected feces and urine was carried out to the magnetic crucible, it melted after 18 hour ashing and in the hydrochloric acid of 0.1N within the 550-degree C electric furnace, the magnesium content was measured using ion plasma-emission-spectrometry equipment (Shimadzu ICP-S5000), and it asked for content. The absorption coefficient and the rate of a hold of magnesium were computed by the lower formula from the actual measurement of the magnesium content in feed, and the amount of mineral passage to the inside of feces and urine.

[0016]

[Equation 1] rate = {(amount of passage among amount [of passage among intake-excrement] - urine)/intake} x 100 [0017 of intake = feed intake x mineral content appearance --] [of absorption coefficient = {(amount of passage among intake-excrement)/intake} x 100 hold] As shown in Table 2, by the group which took in the magnesium supply material of this invention, the number of

sideration of the rubor symptom of the pinna section and the regio occipitalis capitis and mitigation of a grade accept as compared with the group which took in only a control group and magnesium, and the weight of the fructo oligosaccharide to magnesium did not show the symptoms of a result at all by G group and H group of 200 times or more. moreover, the group which took in the magnesium supply material (the weight of the fructo oligosaccharide to magnesium is 10 or more times) of this invention also about the magnesium absorption coefficient and the rate of a hold as compared with the group which took in only magnesium as shown in Table 3 -- being significant (5% or less of level of significance) -- a high price is shown, the magnesium supply material of this invention is excellent in an absorptivity and living body availability, and it was checked that the improvement effect of the rubor symptom based on magnesium lack is also high

[0018]

[Table 2]

表2 本発明のマグネシウム補給材の皮膚発赤症状の発症状況に及ぼす影響

群名	発症例 (例/例)	炎症程度 (例)				
		-	±	+	++	+++
A	7/7	0	0	4	2	1
B	7/7	0	0	2	5	0
C	7/7	0	2	4	1	0
D	7/7	0	5	2	0	0
E	7/7	0	6	1	0	0
F	7/7	0	5	2	0	0
G	0/7	7	0	0	0	0
H	0/7	7	0	0	0	0

- : 発赤なし ± : 殆ど発赤なし + : 軽度発赤あり
 ++ : 中程度発赤あり +++ : 重度発赤あり
 (* : 危険率5%以下で有意差あり)

[0019]

[Table 3]

表3 本発明のマグネシウム補給材のマグネシウム吸収率および保留率に及ぼす影響

	吸収率 (%)	保留率 (%)
A	-	-
B	44.4±3.1	30.7±2.3
C	46.7±2.5	34.4±5.6
D	47.6±2.2 *	34.8±3.8 *
E	49.1±4.3 *	36.2±6.2 *
F	48.2±3.2 *	36.8±5.8 *
G	72.1±4.1 *	44.9±5.9 *
H	79.4±2.3 *	51.4±3.4 *

平均値±標準偏差 (n=7)
 (* : 危険率5%以下で有意差あり)

[0020] After breeding the Sprague-Dawley system male rat (weights 100-110g) of example 24 week-old for one week by the standard solid sample (product made from MF:oriental yeast), it carried out much one groups [six], and the examination was presented. The feed which added only magnesium in the feed which does not contain magnesium was considered as the contrast, and the rat was made to take in the feed which added four kinds of magnesium supply material of this invention for 14 days, as shown in Table 4. In addition, feed and potable water were considered as free uptake at potable water using the aqua destillata. It made an incision in the abdomen under the etherization at the time of an examination end, and from the inferior vena cava, it slaughtered by whole-blood blood collecting, and the ren on either side was extracted. After the extracted ren measured the weight, weighing capacity was carried out to the magnetic crucible, it melted in the hydrochloric acid of 0.1N after 18 hour ashing within the 550-degree C electric furnace, and it measured calcium using ion plasma-emission-spectrometry equipment (Shimadzu ICP-S5000), and calculated the content.

[0021]

[Table 4]

表4 試験試料組成表(%)

	本発明のマグネシウム補給材				
	A	B	C	D	E
カゼイン	25.0	25.0	25.0	25.0	25.0
グアニニュー糖	46.8	46.8	45.8	41.8	36.8
植物油	10.0	10.0	10.0	10.0	10.0
ビタミン混合(AIN-76 改変)	1.0	1.0	1.0	1.0	1.0
セルロースパウダー	5.0	5.0	5.0	5.0	5.0
ミネラル混合	3.5	3.5	3.5	3.5	3.5
(AIN-76 改変マグネシウム無添加)					
炭酸カルシウム	2.6	2.6	2.6	2.6	2.6
燐酸ナトリウム二水和物	6.0	6.0	6.0	6.0	6.0
塩化マグネシウム	0.1	0.1	0.1	0.1	0.1
フラクトオリゴ糖	—	0.5	1.0	5.0	10.0
フラクトオリゴ糖/マグネシウム比		20	40	200	400

[0022] As for the result, as shown in Table 5, by the group which took in the magnesium supply material of this invention as compared with the control group which took in only magnesium, the amount of calcium in the ren is low, sideration of a renal calculus is suppressed, and a ren weight did not have hypertrophy of the ren lightly intentionally, either. It was checked by this that the magnesium supply material of this invention has the effect which prevents sideration of the renal calculus based on magnesium lack.

[0023]

[Table 5]

表5 本発明のマグネシウム補給材の腎臓に及ぼす影響

	腎臓重量 (g)	腎臓中マグネシウム量 (mg/g 臓器)
A	3.08±0.49	5.22±1.99
B	2.85±0.36	4.81±3.76
C	2.78±0.61	3.02±1.46
D	2.40±0.26*	1.71±1.03*
E	2.45±0.15*	1.37±0.36*

平均値±標準偏差 (n=6)

(* : 危険率5%以下で有意差あり)

[0024] After breeding the Sprague-Dawley system male rat (weights 100-110g) of example 34 week-old for one week by the standard solid sample (product made from MF:oriental yeast), it carried out much one groups [seven], and the examination was presented. As shown in Table 6, considered as the contrast the feed which added the lactose to the feed which added only magnesium in the feed which does not contain magnesium, and this, the rat was made to take in the feed which added five kinds of magnesium supply material of this invention for 14 days, and the accounts examination of magnesium was performed for the four days on the 14th from the 10th. Feed and potable water were considered as free uptake at potable water using the aqua destillata. Analysis of the produced feed and the collected excrement and calculation of the absorption coefficient of magnesium were performed by the same technique as an example 1.

[0025]

[Table 6]

表6 試験試料組成表(%)

	本発明のマグネシウム補給材						
	A	B	C	D	E	F	G
カゼイン	25.0	25.0	25.0	25.0	25.0	25.0	25.0
グラニュー糖	55.4	50.4	50.4	50.4	50.4	50.4	50.4
植物油	10.0	10.0	10.0	10.0	10.0	10.0	10.0
ビタミン混合(AIN-76 改変)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
セルロースパウダー	5.0	5.0	5.0	5.0	5.0	5.0	5.0
ミネラル混合	3.5	3.5	3.5	3.5	3.5	3.5	3.5
(AIN-76 改変マグネシウム無添加)							
炭酸カルシウム	2.6	2.6	2.6	2.6	2.6	2.6	2.6
炭酸ナトリウム二水和物	6.0	6.0	6.0	6.0	6.0	6.0	6.0
酸化マグネシウム	0.08	0.08	0.08	0.08	0.08	0.08	0.08
乳糖	—	5.0	—	—	—	—	—
フラクトオリゴ糖	—	—	5.0	—	—	—	—
ガラクトオリゴ糖	—	—	—	5.0	—	—	—
ビートオリゴ糖	—	—	—	—	5.0	—	—
ラクチュロース	—	—	—	—	—	5.0	—
ソルビトール	—	—	—	—	—	—	5.0

[0026] both the groups of the control group which took in the feed which added the lactose to the control group and this which took in the feed with which the magnesium absorption coefficient of the group which took in the magnesium supply material of this invention added only magnesium as a result was shown in Table 7 -- comparing -- being significant (5% or less of level of significance) -- a high price is shown and it was checked that the magnesium supply material of this invention is excellent in an absorptivity

[0027]

[Table 7]

表7 本発明のマグネシウム補給材のマグネシウム吸収率

マグネシウム吸収率 (%)	
A	50.3±3.3
B	62.4±4.3
C	86.5±1.3*
D	85.7±6.9*
E	86.5±1.3*
F	78.6±5.6*
G	74.7±2.0*

平均値±標準偏差 (n=7)

(*: 危険率5%以下で有意差あり)

[0028] After breeding the Sprague-Dawley system male rat (weights 100-110g) of example 44 week-old for one week by the standard solid sample (product made from MF-oriental yeast), it carried out much one groups [seven], and the examination was presented. As shown in Table 8, considered as the contrast the feed which added only magnesium in the feed which does not contain magnesium, and the feed which added the magnesium of the amount of double of this feed further, the rat was made to take in the feed which added two kinds of magnesium supply material of this invention for 28 days, and the accounts examination of magnesium was performed for the four days on the 28th from the 24th. At the time of an examination end, slaughter dissection of the rat was carried out and the femur was extracted. In addition, feed and potable water were considered as free uptake at potable water using the aqua destillata. Analysis of the produced feed and the collected excrement and calculation of the absorption coefficient of magnesium were performed by the same technique as an example 1. Moreover, analysis of the calcium in a femur was performed by the same technique as an example 2.

[0029]

[Table 8]

表8 試験試料組成表(%)

	A	B	本発明のマグネシウム補給材	
			C	D
カゼイン	25.0	25.0	25.0	25.0
グラニュー糖	46.8	46.8	41.8	36.8
植物油	10.0	10.0	10.0	10.0
ビタミン混合(AIN-76 改変)	1.0	1.0	1.0	1.0
セルロースパウダー	5.0	5.0	5.0	5.0
ミネラル混合	3.5	3.5	3.5	3.5
(AIN-76 改変マグネシウム無添加)				
炭酸カルシウム	2.6	2.6	2.6	2.6
磷酸ナトリウム二水和物	6.0	6.0	6.0	6.0
塩化マグネシウム	0.1	0.2	0.1	0.1
フラクトオリゴ糖	—	—	5.0	10.0
フラクトオリゴ糖/マグネシウム比			200	400

[0030] the control group which took in the feed with which the magnesium absorption coefficient of the group which took in the magnesium supply material of this invention added only magnesium as a result was shown in Table 9 -- comparing -- being significant (5% or less of level of significance) -- a high price is shown and it was checked that the magnesium supply material of this invention is excellent in an absorptivity By D group which added the magnesium supply material of this invention, it was checked that the enhancement in the absorbed dose unsolvable only by and making the intake of magnesium increase from the group which took in the feed which carried out the amount addition of the magnesium of double about the absorbed dose can also be obtained.

[0031]

[Table 9]

表9 本発明のマグネシウム補給材のマグネシウム吸収率および吸収量

	マグネシウム吸収率 (%)	マグネシウム吸収量 (mg)
A	34.1±9.0	5.7±1.7
B	36.5±5.1	12.4±1.8
C	62.5±5.6 *	12.0±1.4 *
D	77.8±2.7 *	15.6±2.5 *

平均値±標準偏差 (n=7)

(* : 危険率5%以下で有意差あり)

[0032] Moreover, as shown in Table 10, the content of the calcium in a bone also increases intentionally and the decrement of the ossification based on lack of magnesium was prevented.

[0033]

[Table 10]

表10 本発明のマグネシウム補給材の大腸骨カルシウム含有率におよぼす影響

	カルシウム含有率 (%)
A	25.7±0.29
B	25.9±0.62
C	26.7±0.67*
D	28.6±0.53*

平均値±標準偏差 (n=7)

(* : 危険率5%以下で有意に高値)

[0034] 5g of magnesium chlorides was melted in the ethanol aqueous solution 5500ml of 50% of examples. 100g of sodium alginates was supplied gradually, stirring this solution. Furthermore, centrifugal separation was performed and sedimentation was collected, after continuing stirring at a room temperature for 1 hour. this sedimentation -- ethanol -- after washing and 80-degrec C constant temperature -- the material (alginic-acid combination type Mg) which combined magnesium with the dietary fiber was obtained by carrying out overnight xeransis by the inside of a plane Thus, the

magnesium content of the manufactured material was 1.888%.

[0035] After breeding the Sprague-Dawley system male rat (weights 100-110g) of example 64 week-old for one week by the standard solid sample (product made from MF:oriental yeast), it carried out much one groups [seven], and the examination was presented. As shown in Table 11, considered the feed which added only magnesium in the feed which does not contain magnesium as the contrast, the rat was made to take in the feed which added three kinds of magnesium supply material of this invention (it becomes an equivalent magnesium content like [all]) for 14 days, and the accounts examination of magnesium was performed for the four days on the 14th from the 10th. Feed and potable water were considered as free uptake at potable water using the aqua destillata. Analysis of the produced feed and the collected excrement and calculation of the absorption coefficient of magnesium were performed by the same technique as an example 1. Moreover, analysis of calcium was performed by the same technique as an example 2.

[0036]

[Table 11]

表 11 試験飼料の組成

	対 照	本発明のマグネシウム補給材		
		A	B	C
カゼイン	25.0	25.0	25.0	25.0
コーンスターチ	53.5	53.5	53.5	53.5
グラニュー糖	5.0	5.0	5.0	5.0
コーン油	5.0	5.0	5.0	5.0
ビタミン混合	1.0	1.0	1.0	1.0
(AIN-76 改変マグネシウム無添加)				
ミネラル混合	1.26	1.26	1.26	1.26
(AIN-76 改変Ca, Mg, P 無添加)				
CaHPO ₄ · 2H ₂ O	4.29	4.29	4.29	4.29
MgO	0.082	0.079	0.082	—
セルロースパウダー	4.92	0.06	2.27	2.35
ペクチン	—	4.88	—	—
アルギン酸ナトリウム	—	—	2.65	—
アルギン酸結合型Mg*	—	—	—	2.65

* Mg含有量 1.888%

[0037] Consequently, as shown in Table 12, it was checked that the magnesium absorption coefficient and absorbed dose of a group which took in the magnesium supply material of this invention are excellent compared with the control group which took in the feed which added only magnesium, and the magnesium supply material of this invention is excellent in an absorptivity. especially the magnesium absorption coefficient and absorbed dose of a group that took in the mixture of magnesium and pectin, and alginic-acid combination type Mg -- being significant (5% or less of level of significance) -- the high price was shown moreover -- the group which took in alginic-acid combination type Mg although the absorption coefficient and absorbed dose of calcium fell intentionally by the group which took in the feed which mixed the alginic acid with magnesium compared with the control group -- being significant (5% or less of level of significance) -- a high price is shown and also promoting absorption of calcium was checked Moreover, the group which took in the feed which mixed pectin showed the good calcium absorption promotion operation similarly to magnesium.

[0038]

[Table 12]

表 1 2 マグネシウムとカルシウムの吸収率および吸収量

群 名	マグネシウム		カルシウム	
	吸収量(mg/日)	吸収率(%)	吸収量(mg/日)	吸収率(%)
対 照	3.74 ±0.61	38.5±6.8	58.3 ±6.6	30.5±4.5
A	4.37 ±0.56*	51.6±7.1 *	68.6 ±9.7 *	50.7±7.0 *
B	3.77 ±0.52	44.7±4.7	43.4 ±9.3	26.6±5.5
C	4.66 ±0.35*	48.5±3.2 *	70.5 ±7.0 *	37.8±4.4 *

* P <0.05

[Translation done.]